Testimony of

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On behalf of the

Michigan Professional Fire Fighters

May 22, 2012

Good morning, Mr. Chairman and members of the committee. Thank you for allowing me to present to you. I am Dr. Virginia Weaver, a physician and Associate Professor of Occupational Medicine at the Johns Hopkins University Bloomberg School of Public Health. I am here today at the request of the International Association of Fire Fighters (IAFF) on behalf of the Michigan Professional Fire Fighters. My testimony today is my own and does not necessarily reflect the views of The Johns Hopkins University.

Today I will discuss three related topics:

1) the wide range of cancer-causing chemicals that fire fighters are exposed to in their work;
2) the increased cancer risk fire fighters experience as a result of these exposures, and;

3) how the proposed change in workers' compensation can make a dramatic difference in the lives of fire fighters who develop a work-related cancer.

I would like to start by briefly telling you about the IAFF and my involvement with this organization. The IAFF is an international union that represents approximately 300,000 paid professional fire service employees in the United States and Canada. The IAFF has been actively involved in improving the health and safety of fire fighters for more than 90 years. This is a critical activity for a workforce in which fatalities and early retirement due to work-related injuries and illnesses occur regularly. I have been involved with the Union since I rotated there as a resident in the Johns Hopkins Occupational Medicine Residency back in 1991. I now direct that residency and over the years I have watched our residents spend time at IAFF and develop the same appreciation for the union that I have.

Occupational Exposures of Fire Fighters

In the vast majority of US workplaces, occupational exposure levels have greatly declined in the past 2-3 decades. Improved workplace conditions can be attributed to many factors including governmental occupational safety and health agencies, legislation, union efforts, training programs for occupational health professionals, and good business practice including the need to keep highly skilled workers healthy and working and to conserve raw materials. I see this dramatic change when we take students at Johns Hopkins on plant tours as part of their coursework. So much manufacturing is now automated and enclosed that they commonly return to school and ask – but where were the workers? Where were the exposures?

Unfortunately, fire fighters have not benefited from this overall improvement. They are still entering uncontrolled, hazardous environments regularly. **Studies of the chemicals contained within the smoke that fire fighters commonly encounter during fire suppression and overhaul activities have clearly documented reason for concern about these exposures. Smoke is a complex mixture of cancer causing chemicals from combustion of all the various products in modern fires.** We all know that cigarette smoking causes cancer. In fact, the surgeon general now considers 12 different

cancers to be related to smoke from tobacco. Wood, coal and diesel fuel smoke are also considered known or probable carcinogens. Occupational health experts rely on the International Agency for Research on Cancer (IARC) to categorize chemicals for their potential to cause cancer in humans. Studies have revealed that fire fighters are commonly exposed to many chemicals that IARC states are known to cause cancer in humans. Examples include asbestos, benzene, benzo[a]pyrene, formaldehyde, 1,3-butadiene, and soot, the exposure that causes cancer in chimney sweeps.[i] Fire fighters are also exposed to probable human carcinogens such as diesel engine exhaust and combustion products of wood. In addition, thousands of new synthetic chemicals are produced annually, making it impossible to study the toxic properties of each one, let alone the toxic properties of their combustion products. Yet fire fighters are exposed to smoke from all of these products.

A Harvard study that examined levels of a number of air contaminants at more than 200 structural fires provides an excellent example of the **uncontrolled, hazardous nature of fire fighter exposures.**[ii] In that study, the carcinogen, benzene was detected in 92% of samples; half were over 1 part per million (ppm), which is the current Occupational Safety and Health Administration (OSHA) permissible exposure level. One study reported benzene levels more than 200 times the OSHA limit.[iii] Evidence of the large number of chemicals that can be present in smoke is provided by a study that reported more than 70 different chemicals in smoke from monitored fire scenes.[iv]

Further adding to the risk is the fact that **the only available form of protection for fire fighters is also the least effective of the established workplace exposure controls.** Personal protective equipment, such as respirators and turn-out gear, is last in what we call the hierarchy of controls, far inferior to such remedies as substitution with a safer chemical, enclosure of the hazard, and ventilation. Why is this? Because this equipment does not completely eliminate exposure and if exposure is high, as commonly occurs in fire fighting, worker exposures, even with use of such equipment, will still occur. For example, despite using turn-out gear, fire fighters commonly note soot on their skin after working major fires. And, in the past, removal of respirators during overhaul was common in order to better detect areas that could reignite. However, we now know this results in inhalation of carcinogens.

Fire Fighter Cancer Risk

Given the uncontrolled exposures to carcinogens that fire fighters regularly encounter, many studies to examine the risk for cancer in firefighters have been conducted. Statistically significant elevations in various cancers have been reported in different studies using a range of research approaches. The results of many such studies have been summarized in a recent report by LeMasters and colleagues.[v] This study is a meta-analysis, which is a research technique used to combine many smaller studies. The advantage of this is that research with more participants is better able to detect true increases in risk. Results combining all data in 32 studies of fire fighters for 20 different cancer types are presented in Table 5 of the LeMasters report. Notably, **risks for 10 types of cancer (50%) were significantly increased in fire fighters and risks for the other 10 were increased but did not reach statistical significance.**

Of note, an unpublished National League of Cities report entitled "Assessing State Firefighter Cancer Presumption Laws and Current Firefighter Cancer Research" from April, 2009 (the TriData study), did not use the statistical technique of combining existing studies and, as a result of this weaker approach, did not find the same risk.

Level of Fire Fighter Cancer Risk and Reasons for Underestimation

In the LeMasters study, a two times higher risk for testicular cancer was found. The other significantly associated cancers were increased by 20 to 50%. **It is likely that the risk is even higher because there are several major challenges in accurately studying risk in fire fighters and ALL result in underestimation of risk.**

The first challenge is exposure assessment. In controlled manufacturing settings, air monitoring is performed to calculate routine exposures. There is no way to do that for fire fighters. As a result, many studies simply list exposure as yes or no based on occupation as a fire fighter. In an effort to better estimate actual carcinogen dose, some studies use years spent as a fire fighter. However, do exposures encountered during 20 years as a fire fighter in a quiet residential area result in the same cancer risk as 20 years in an urban

industrial fire station? Probably not. What about number of runs? Again, combustion products in fires differ and fires involving industrial settings and/or synthetic products are likely to entail higher carcinogen exposures. What is the effect of this "misclassification" where high risk fire fighters may end up classified in the low risk group and/or the risk group is diluted by fire fighters with less true carcinogen exposure or fire fighters may even end up in the control group in studies that use longest held occupations? Underestimation of true risk. This makes it appear that fire fighters are not at risk for cancer.

The next challenge is the healthy worker effect. In order to perform the physically demanding work involved in fire fighting, workers must enter the workforce very fit and continue to exercise and watch their diet to control weight and maintain physical ability in their fire fighting careers. This is evident in the LeMasters study, in which, overall, fire fighters have a 10% less risk of dying at a given age than the rest of us. How does the overall good health of fire fighters affect the outcome of cancer research in this workforce? Again, the risk is underestimated because their risk starts out below the general population to which they are compared. As a result, when a study finds firefighters to have *any* increase in cancer rates relative to the general population it is unsettling.

Further, the small numbers of fire fighters affected by individual cancers decrease the ability to detect increases in risk. Fire fighters comprise a relatively small occupational group and the large number of different cancers to be considered makes this a huge challenge.

Overall, given the challenges in this body of research, the likelihood is strongly AGAINST observing risk in firefighters. Thus, it is clear that fire fighters are at risk for many cancers not just the four listed as "probable" by LeMasters and co-workers.

Impact of Workers' Compensation For Fire Fighters Who Develop Occupationally Related Cancer

When fire fighters are diagnosed with cancer as a result of their job, they face a system that is stacked against them. In the absence of presumptive legislation, the fire fighter has to shoulder the burden of proving that his or her cancer is work-related. The fire fighter has to find legal counsel to help with the process and a health care provider who understands the complex causation issues for work-related disease which is much more challenging than for injuries. Sometimes they are even asked to identify the exact exposure that caused their cancer which is clearly impossible. In addition, cancer treatment is often a very difficult process which can take many months. When these occupationally-induced cancers are not covered by workers compensation, fire fighters must use up leave time and may have to use personal savings in order to cover medical costs after the insurance maximum is met. Workplace accommodations are very difficult for cancer patients when the work is as physically demanding as fire fighting. It's true that whether it's health insurance or workers compensation, someone in the system has to pay the costs. But these **additional burdens should not be placed on fire fighters when they develop cancers that studies have shown are clearly a result of their occupation.**

Several reasons are commonly presented against presumptive cancer legislation. First, is the concept of the slippery slope, if we do this for one occupation we will have to do this for all. As I have shown in my initial discussion on fire fighter exposures, there are dramatic differences between their exposures and the rest of the US workforce. These differences make presumptive legislation uniquely applicable to fire fighters. Importantly, although the majority of states in the US have already adopted presumption workers' compensation for fire fighters, this has not resulted in extension of this benefit to other occupations. Another important point is that presumption of cancer is rebuttable and if an individual fire fighter has non-occupational risk factors that outweigh their occupational risks, workers' compensation will still be denied. Lastly, cost is a common concern. However the TriData study, supported by the National League of Cities, was unable to find any evidence of increased costs.

In summary, air monitoring clearly documents that fire fighters are exposed to carcinogens at high levels in their work. Data also clearly show that fire fighters are at increased risk of developing and dying from specific cancer. For a number of reasons, the risks are likely substantially higher than the studies report. We also know that the current workers' compensation system places an enormous burden on individual fire fighters who develop cancer.

Presumption of cancer in fire fighters is becoming accepted throughout the country. Currently, more than 30 states in the United States have such legislation. It is time that Michigan acts on the science and enacts legislation to help fire fighters who develop work-related cancers.

Thank you for your time and consideration.

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[i] http://monographs.iarc.fr/ENG/Classification/index.php (accessed 10/14/08)
[ii] Treitman RD, Burgess WA, Gold A (1980): Air contaminants encountered by fire fighters. Am Ind Hygiene Assoc J 41:796-802.
[iii] Brandt-Rauf PW, Fallon JR, Tarantini T, et al.. Health Hazards Of Fire Fighters: Exposure Assessment. British Journal of Industrial Medicine. 1988;45:606-612.
[iv] Lowry WT, Juarez L, Petty CS and Roberts B. Studies of toxic gas production during actual structural fires in the Dallas area. J Forensic Sci. 1985;30:59-72.
[v] LeMasters GK, Genaidy AM, Succop P, Deddens J, Sobeih T, Barriera-Viruet H, Dunning K, Lockey J. Cancer Risk Among Firefighters: a Review and Meta-analysis of 32 Studies. J Occup Environ Med. 2006 Nov;48(11):1189-202.